

What is claimed is:

1 1. An interface device for interfacing instruments to a simulation system to
2 enable a user to interact with the simulation system to perform a medical procedure on a
3 simulated anatomy of a virtual patient, said interface device comprising:
4 a peripheral in the form of a mock medical instrument capable of selective
5 manipulation by the user;
6 an orifice for receiving said instrument;
7 a guide tube for directing said instrument from said orifice into said interface device;
8 a capture mechanism for engaging said instrument to enable said interface device to
9 measure manipulation of and provide force feedback to said instrument; and
10 a sensing assembly to measure manipulation of and provide force feedback to said
11 instrument, wherein said sensing assembly includes:

12 motion detection means to measure manipulation of said captured instrument
13 and provide signals indicating said measured manipulation to said simulation system
14 to simulate said medical procedure; and

15 force application means to apply force feedback to said captured instrument in
16 response to control signals from said simulation system.

1 2. The device of claim 1 wherein said instrument includes an endoscope.

1 3. The device of claim 1 wherein said instrument includes a nested instrument
2 assembly, and said interface device further includes:

3 a plurality of capture mechanisms each engaging a corresponding instrument
4 of said instrument assembly to enable said interface device to measure manipulation
5 of and provide force feedback to that instrument; and

6 a plurality of sensing assemblies each measuring manipulation of and
7 providing force feedback to said corresponding instrument.

1 4. The device of claim 1 wherein said interface device further includes a pivoting
2 mechanism to pivot said orifice.

5. An interface device for interfacing instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure on a simulated anatomy of a virtual patient, said interface device comprising:

- a plurality of peripherals in the form of mock medical instruments capable of selective manipulation by the user;
- a plurality of orifices for receiving said instruments;
- a plurality of guide tubes for directing said instruments from said orifices into said interface device;
- a plurality of capture mechanisms for engaging said instruments to enable said interface device to measure manipulation of and provide force feedback to said instruments;
- and
- a plurality of sensing assemblies to measure manipulation of and provide force feedback to said instruments, wherein each said sensing assembly includes:
 - motion detection means to measure manipulation of a corresponding captured instrument and provide signals indicating said measured manipulation to said simulation system to simulate said medical procedure; and
 - force application means to apply force feedback to said corresponding captured instrument in response to control signals from said simulation system.

6. The device of claim 5 wherein at least one of said instruments includes a nested instrument assembly.

7. In an interface device for interfacing instruments to a simulation system to enable a user to interact with the simulation system to perform a medical procedure, a capture mechanism for engaging an instrument inserted within the interface device to enable the interface device to measure manipulation of and provide force feedback to that instrument, said capture mechanism comprising:

- a grasping member for engaging said instrument to enable said interface device to measure manipulation of and provide force feedback to said instrument; and
- an actuator for activating said grasping member to engage said instrument in response to user manipulation of said instrument.

1 8. A method for interfacing instruments to a simulation system, via an interface
2 device, to enable a user to interact with the simulation system to perform a medical procedure
3 on a simulated anatomy of a virtual patient, said method comprising the steps of:

4 (a) inserting a peripheral in the form of a mock medical instrument into said interface
5 device via an orifice and guide tube, and selectively manipulating said instrument within said
6 interface device;

7 (b) engaging said instrument, via a capture mechanism, to enable said interface
8 device to measure manipulation of and provide force feedback to said instrument;

9 (c) measuring manipulation of said captured instrument and providing signals
10 indicating said measured manipulation to said simulation system to simulate said medical
11 procedure; and

12 (d) applying force feedback to said captured instrument in response to control signals
13 from said simulation system.

1 9. The method of claim 8 wherein said instrument includes an endoscope.

1 10. The method of claim 8 wherein said instrument includes a nested instrument
2 assembly, and step (b) further includes:

3 (b.1) engaging each instrument of said instrument assembly to enable said
4 interface device to measure manipulation of and provide force feedback to that
5 instrument;

6 step (c) further includes:

7 (c.1) measuring manipulation of said each instrument and providing signals
8 indicating said measured manipulation to said simulation system; and

9 step (d) further includes:

10 (d.1) applying force feedback to said each instrument in response to control
11 signals from said simulation system.

1 11. The method of claim 8 wherein step (a) further includes:

2 (a.1) pivoting said orifice to a desired orientation.

ADD A1
ADD B1